

LISTING OF CLAIMS:

1. (Currently Amended) A heat sink for electrical or electronic components comprising:

a heat spreader plate to which the components to be cooled are connected;

at least two heat conducting fins that are positioned substantially parallel to one another and which are connected substantially perpendicular to said heat spreader plate;
and

at least one foam block that is disposed in the space between parallel fins wherein said block is formed of reticulated foam to define a highly porous, heat conducting, open-celled structure that permits a cooling fluid to flow through said block as the cooling fluid passes across said fins; and

said at least one foam block being made from aluminum, copper, graphite, or aluminum-nitride ceramic.

2. (Previously Presented) A heat sink of claim 22 wherein said fins and said foam blocks are connected to one surface of said heat spreader plate.

3. (Previously Presented) A heat sink of claim 1 wherein the fin height, **b**, is determined by the relationship,

$$b = 0.6498 \sqrt{\frac{k_f \delta_f}{h}}$$

where,

k_f is the thermal conductivity of the selected fin material, Btu/ft s °F

δ_f is the fin thickness, ft

h is the convective heat transfer coefficient for the foam-filled space bounded by said fins and said heat spreader plate, Btu/ft² s °F, and where h is given by the formula,

$$h = 1.2704 \left[\frac{n^{0.50}}{(1-\phi)^{0.25}} \right] \left(\frac{\rho^{0.50} k^{0.63} c_p^{0.37}}{\mu^{0.13}} \right) u_m^{0.50}$$

where,

n is the linear density of said at least one foam block, pores per ft

ϕ is the porosity of said at least one foam block, expressed as a fraction

Applicant: Eesley et al.
Serial No.: 09/804,756
Art Unit:3743

ρ is the density of the cooling fluid that passes across said fins, lb_m/ft^3

k is the thermal conductivity of the cooling fluid, $\text{Btu}/\text{ft s } ^\circ\text{F}$

c_p is the isobaric specific heat of the cooling fluid, $\text{Btu}/\text{lb}_m ^\circ\text{F}$

μ is the dynamic viscosity of the cooling fluid, $\text{lb}_m/\text{ft s}$

u_m is the mean velocity of the cooling fluid, ft/s

4. (Previously Presented) A heat sink of claim 1 wherein the fin spacing, a , is determined by the relationship,

$$a = \Phi \delta$$

where,

Φ is between 1 to 6

δ , ft, is determined by the relation,

$$\delta = 7.32 \sqrt{\frac{kc}{\rho c_p u_m}}$$

where,

c is the selected fin length in the flow direction, ft

k is the thermal conductivity of the cooling fluid that passes across said fins, $\text{Btu}/\text{ft s } ^\circ\text{F}$

ρ is the density of the cooling fluid lb_m/ft^3

c_p is the isobaric specific heat of the cooling fluid, $\text{Btu}/\text{lb}_m ^\circ\text{F}$

u_m is the mean velocity of the cooling fluid, ft/s .

5. (Previously Presented) A heat sink of claim 1 wherein said heat spreader plate, said fins and said at least one foam block are made from the same or different thermal conducting materials.

6. (Currently Amended) A heat sink of claim 1 wherein said heat spreader plate[[,]] and said fins ~~and said at least one foam block~~ are made from aluminum, copper, graphite or aluminum-nitride ceramic.

7. (Currently Amended) A heat sink of claim 1 wherein said heat spreader plate[[,]] and said fins ~~and said at least one foam block~~ are made from aluminum.

Claims 8 – 20: Cancelled

Applicant: Eesley et al.
Serial No.: 09/804,756
Art Unit:3743

21. (Previously Presented) A heat sink of claim 1 wherein said fins and said at least one foam block are connected to one surface of said heat spreader plate.

22. (Previously Presented) A heat sink of claim 1 wherein said at least one foam block is further defined as a plurality of foam blocks.

23. (Previously Presented) A heat sink of claim 22 wherein said fins are connected to said heat spreader plate through thermal bonding.

24. (Previously Presented) A heat sink of claim 22 wherein said fins are connected to said foam blocks through thermal bonding.

25. (Previously Presented) A heat sink of claim 23 wherein said fins are connected to said foam blocks through thermal bonding.

26. (Previously Presented) A heat sink of claim 1 wherein said fins are connected to said heat spreader plate through thermal bonding.

27. (Previously Presented) A heat sink of claim 1 wherein said fins are connected to said at least one foam block through thermal bonding.

28. (Previously Presented) A heat sink of claim 26 wherein said fins are connected to said at least one foam block through thermal bonding.